



# TETON WIRELESS HIGH SPEED DATA

& Television

Idaho Falls, ID • Missoula, MT • Twin Falls, ID • Pocatello, Idaho • Walla Walla, WA • Pendleton, OR

February 3, 2004

***By Electronic Filing***

Ms. Marlene H. Dortch  
Office of the Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, S.W., TW-A325  
Washington, D.C. 20554

Re: **NOTICE OF EX PARTE PRESENTATION**  
Teton Wireless Television, Inc.  
WT Docket No. 03-66, RM-10586, WT Docket No. 03-67,  
MM Docket No. 97-217, WT Docket No. 02-68, RM-9718

Dear Ms. Dortch:

Teton Wireless Television, Inc. ("Teton") hereby responds to the reply comments filed by the Wireless Communications Association, Inc., the National ITFS Association and Catholic Television Association (the "Coalition") to the Notice of Proposed Rulemaking in the above-referenced proceeding.<sup>1</sup>

It appears the Coalition used a study in its Reply Comments that overstates the potential for interference from a high power, high site incumbent operation in Twin Falls operated by Teton, to a future, potential low power system in Boise.

In its Comments in this proceeding, Teton stated the following:

The Commission questions in the *NPRM* "whether every market requires a uniform band plan,"<sup>2</sup> and whether operating at higher power in rural areas might be acceptable: "We note that our *Spectrum Policy Report* raises the possibility of allowing licensees in uncongested rural areas to operate at higher power levels, provided they do not thereby generate unacceptable interference in urban areas."<sup>3</sup>

<sup>1</sup> *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, Notice of Proposed Rulemaking and Memorandum Opinion and Order, 18 FCC Rcd 6722 (2003) ("*NPRM*").

<sup>2</sup> *Id.* at 6746 ¶ 54.

<sup>3</sup> *Id.* (citing *Spectrum Policy Report* at 58-60).

The Spectrum Policy Task Force “addressed the issue of whether the Commission’s approach to spectrum management should vary in different portions of the spectrum, in different geographic areas, or for different types of uses . . . it was generally recognized that the economic and technical considerations in rural areas are different than in urban areas, and there is some support in the record for applying different rules to spectrum usage in urban and rural areas.”<sup>4</sup>

Teton wholeheartedly agrees with these sentiments and believes that if the Commission does not develop different rules for implementation in rural areas, then it should, at a minimum, afford rural licensees who are providing valuable advanced communications services to the public today with the flexibility to forego implementation of any spectrum changes until the demands of their markets require transition. Teton believes the closest operating MDS system to any Teton system that is operating today is 110 miles away. This is the distance between Boise, Idaho, where Sprint Corporation operates a fixed wireless system, and Twin Falls, Idaho. Operators like Teton in remote rural areas, together with their MDS and ITFS licensees/lessors, who have little or no possibility of interfering with other operators, should not be required to transition the use of their spectrum to new segmented band plans and /or mandatory across the board power limitations, unless and until their rural customers demand it.<sup>5</sup>

The Coalition took issue with Teton’s foregoing position in its Reply Comments, and alleged that *continued operation of Teton’s system in Twin Falls would cause massive interference to a Boise wireless broadband system.*<sup>6</sup> The Coalition attached an engineering study prepared by Kessler & Gehman Associates to demonstrate the “massive interference.” The Coalition then goes on to state that “Teton’s existing operations will adversely impact cellular service outside Teton’s own authorized service area.”<sup>7</sup>

As demonstrated in the attached engineering analysis, the Kessler & Gehman study commissioned by the Coalition significantly overstates the potential for interference. The predicted interference to certain Boise sites is overstated by more than 50%, the predicted interference to the total Boise land area is overstated by 68%, and the predicted interference to the Boise population and households is overstated by approximately 95%. The attached engineering analysis indicates that Teton’s Twin Falls system is predicted to cause *no* interference in the Boise metropolitan area. Consistent with the supposition of the Spectrum Policy Task Force, Teton believes that the Commission should allow rural licensees, like Teton, to operate at higher power levels in uncongested rural areas, especially where, as here, such licensees will not generate unacceptable interference in urban areas.

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<sup>4</sup> *Spectrum Policy Report* at 58.

<sup>5</sup> Teton Comments at 8-9.

<sup>6</sup> October 23, 2003 Reply Comments of the Wireless Communications Association, Inc., the National ITFS Association and Catholic Television Association at 49.

<sup>7</sup> *Id.*

Teton requests that the Commission accept this Supplement in order to ensure that its record is complete. Because this Supplement is being filed in the record, no party will be prejudiced by acceptance of this filing.

Respectfully submitted,

**TETON WIRELESS TELEVISION, INC.**

A handwritten signature in dark ink, appearing to read "Willis E. Twiner", is written over a horizontal line. Below the line is a large, stylized, circular flourish or scribble.

Willis E. Twiner C.E.O.

Terry G. Smith E.V.P.

Teton Wireless Television, Inc.

6659 Kimball Drive,

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Gig Harbor, WA 98335

February 3, 2004



**Analyses of  
A Study of the Impact of the Twin Falls, ID  
MMDS/ ITFS Video Operation on Sprint Cell Sites in  
The Boise-Nampa, ID BTA #50**

**Introduction**

This statement has been prepared on behalf of Teton Wireless Television, Inc. ("Teton") and its subsidiary Teewinot Licensing, Inc. ("Teewinot"). Teton offers broadband and video services over Multipoint Distribution Service ("MDS") frequencies in Twin Falls. Teewinot is the MDS authorization holder for the Twin Falls, ID BTA, B451. This statement is submitted to the Commission in response to comments submitted by the Wireless Communications Association ("WCA"), National ITFS Association ("NIA"), and Catholic Television Network ("CTN") in the Commission's proceeding to facilitate the provision of fixed and mobile broadband services in the 2.1 and 2.5 GHz bands.<sup>1</sup>

A number of parties filed comments and reply comments to the *NPRM*. In particular, WCA hired Kessler & Gehman Associates, Inc., ("K&G") to support its reply comments in the proceeding. K&G's task was to analyze the impact on low power systems if certain existing rural operators, like Teton, are permitted to continue high power operations in adjacent markets under their present, licensed technical parameters. The illustration markets chosen by K&G were Twin Falls and Boise, ID. Specifically, K&G studied the potential for interference that could be caused by the Twin Falls system, if it continues to operate as licensed, on potential low-power operations that may be proposed at a future date for the Boise-Nampa, Idaho, BTA B50.

This paper reviews the K&G study and suggests that the potential for interference, though real, was overstated. Specifically, the K&G study overstates the number of cell sites that could receive interference by more than 50%. More importantly, the number of people and housing units in Boise that could be adversely impacted by continued operations by Teton, as licensed, is just 4% or 5% of what K&G predicts. There is no predicted interference in the Boise metropolitan area.

**Methodology**

The potential for interference in this study was analyzed using the parameters set forth in **Table 1** below. First, the K&G study was replicated. A map showing the replicated results is presented as **Exhibit 3**. Next, the Boise area and cell sites used in the K&G study were restudied using the Longley-Rice v1.2.2 propagation model. To the extent possible, the same parameters were used. In particular, the area studies used a high gain isotropic receive antenna. For the specific sites, a hub antenna standard in many 2.5 GHz systems, an Andrew model DMP18NQ90-V receiving antenna was used. The receive antenna was oriented toward the Twin Falls transmitter to replicate a *worst-case*

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<sup>1</sup> *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, Notice of Proposed Rulemaking and Memorandum Opinion and Order, 18 FCC Rcd 6722 (2003) ("NPRM").*

*scenario*. An antenna mechanical beam tilt of 0° was utilized in all studies. In an actual system deployment, the orientation and beam tilt would vary among receive sites.

The Longley-Rice propagation model is well known and accepted by the Federal Communications Commission. The Longley-Rice model is useful because it considers more of the detail of the terrain along the path between a transmitter and a receiver than does the Free Space + RMD model used by K&G, and thus delivers a more real-world prediction of the interference that could actually occur. Generally, the Longley-Rice model considers more factors affecting signal transmission such as terrain roughness and specific antenna heights relative to terrain in the antenna's immediate vicinity. To maintain comparability, the studies in this report do not consider land use or clutter, factors which are likely to further reduce the interfering signal levels.

## **Findings**

**Exhibit 1** presents a map of the revised study utilizing the Longley-Rice propagation model. When compared to the K&G study, there is significantly less interference area in the Boise-Nampa BTA. Of the specific cell sites studied by K&G, only 8 of the 47 sites are predicted to receive interference at the level of -107.0 dBmW or greater, an interference reference level 6 dB below the noise floor as established by K&G in their study. The K&G study predicted interference to 17 of the 47 sites. K&G's results overstate the predicted interference to the Boise sites by more than 50%.

**Exhibit 2** tabulates signal levels for both studies at the specific Boise PCS sites referenced in the K&G study. For the sites where the K&G study predicted interference and the new studies do not predict interference, terrain profiles are presented as **Exhibits 4 through 12**. Each of the terrain profiles show significant terrain obstructions to the Boise sites which preclude interference.

The interference impact identified by each study within the Boise-Nampa, Idaho, BTA also was compared in relation to the amount of affected land area, population and housing units. A tabulation of the study results is provided below:

<b>Description</b>	<b>K&amp;G Method Study Free Space + RMD</b>	<b>Longley-Rice Study</b>
<b>Land Area Receiving Interference ≥ -107 dBmW</b>	7,097 square miles	2,257 square miles
<b>Affected Population<sup>2</sup></b>	50,220 persons	2,046 persons
<b>Affected Housing Units</b>	17,468 units	1,011 units

As this table demonstrates, the total Boise land area that may receive interference from continued Teton operations, as licensed, is 68% less under the Longley-Rice Study. The potential Boise population that could be affected is 96% less than the K&G study predicts, and the number of affected housing units in

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<sup>2</sup> Population figures based on 1990 Census data.




Boise is 94% less than the K&G study predicts. Stated another way, continued Teton operations in Twin Falls will impact just 4% of the population in the impact area identified in the K&G study, if low power operations are someday licensed and launched Boise. According to this study, the affected population resides outside of the Boise metropolitan area. The majority of area affected under the Longley-Rice study is sparsely populated. The addition of other known factors, including land use clutter, realistic hub antenna patterns and actual vertical alignment of those antennas, would reduce further the actual interference.

The Commission should take note that the predicted real-world interference potential from continued high power operations in Twin Falls, as licensed, on future low power operations in Boise is significantly less than that presented in the K&G study.

### **Certification**

I declare under penalty of perjury that the studies and information presented in the preceding statements were prepared by me or under my direct supervision and are true and in compliance with the Commission's Rules to the best of my knowledge and belief. Should the Commission's Staff require further information or materials regarding the studies and statements provided herein, such will be promptly furnished upon request.

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Timothy L. Warner, P.E.  
Consulting Engineer  
Consultants to Teewinot Licensing, Inc.  
27 January 2004

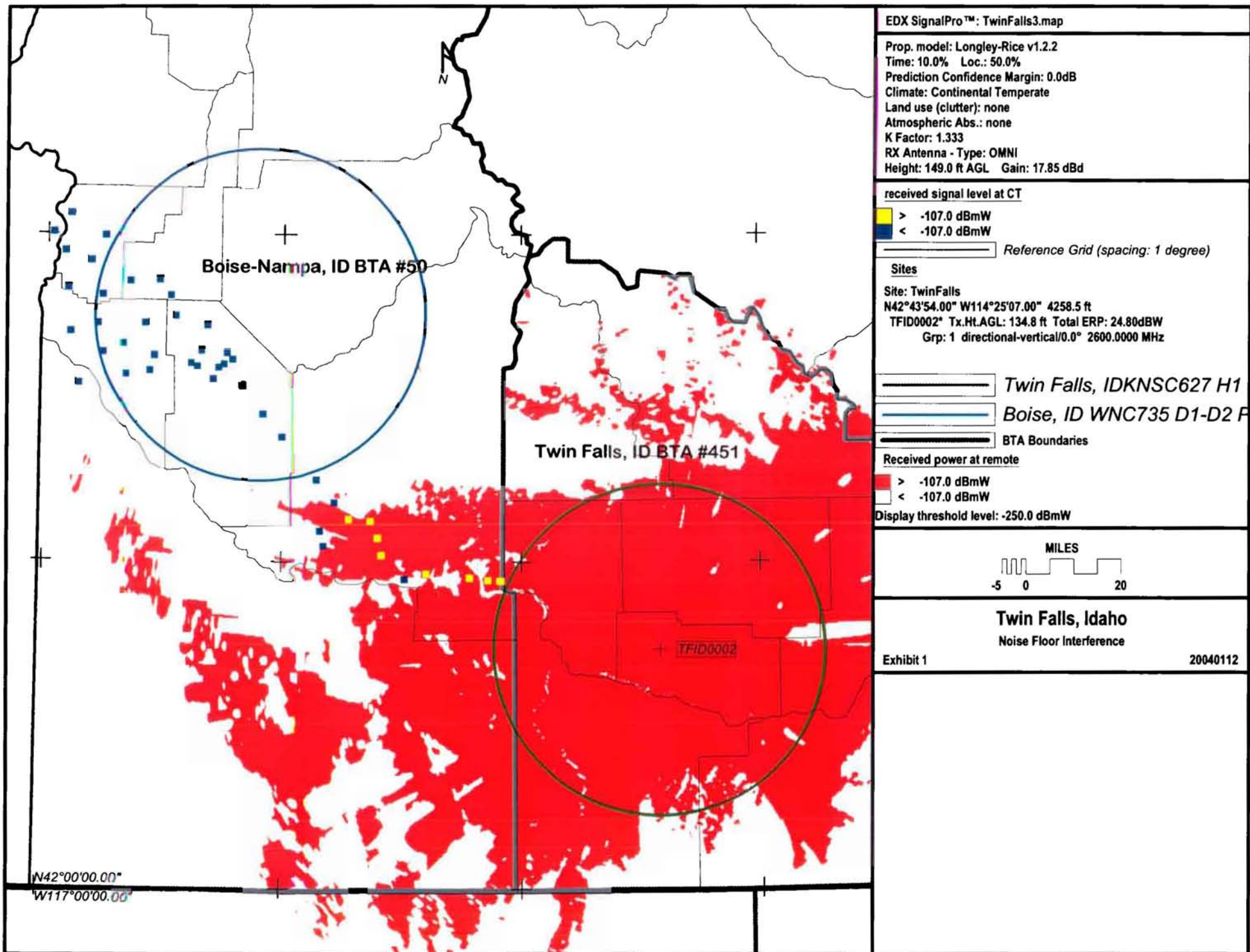
**Table 1: Study parameters**

Description	Verification Study <sup>3</sup>	Longley-Rice Study	Terrain Profile Study
Propagation Model	Free Space + RMD	Longley-Rice v1.2.2	Longley-Rice v1.2.2
Time Variability <sup>4</sup>	10%	10%	10%
Location Variability	50%	50%	50%
Confidence Margin	0 dB	0 dB	0 dB
Climate	Continental Temperate	Continental Temperate	Continental Temperate
Land use (clutter)	none	none	none
Atmospheric Absorption	none	none	none
Ground Reflection	no	yes	yes
Fresnel Zone Loss	no	yes	yes
K Factor	1.333	1.333	1.333
Ground Conductivity	8.0 mS/M	8.0 mS/M	8.0 mS/M
Ground Dielectric Constant	15.0	15.0	15.0
Transmit Antenna Pattern	Andrew HMD12VO	Andrew HMD12VO	Andrew HMD12VO
Transmit ERP	24.8 dBW	24.8 dBW	24.8 dBW
Receive Antenna Pattern: area study	omni	omni	n/a
Receive Antenna Gain: area study	20 dBi	20 dBi	n/a
Receive Antenna Height Above Ground: area study	149 ft	149 ft	n/a
Receive Antenna Pattern: Sprint sites	Omni/Isotropic	Andrew DMP18NQ90-V	Andrew DMP18NQ90-V
Receive Antenna Gain: Sprint sites	20.0 dBi	16.5 dBi	16.5 dBi
Terrain Data	3 arcsecond	3 arcsecond	3 arcsecond
Data point spacing	0.5 mi	0.5 mi	0.06 mi (0.1 km)
Azimuth spacing	1 degree	1 degree	n/a (direct ray)
Noise level	-101 dBm	-101 dBm	-101 dBm
Interference level	-107 dBm	-107 dBm	-107 dBm
Study Area Grid Point Spacing	0.2 mi	0.2 mi	n/a

<sup>3</sup> These parameters were used to replicate the original Kessler & Gehman study.

<sup>4</sup> Time variability for interference prediction in "Methodology for Predicting Interference from Response Station Transmitters and to Response Stations Hubs and for Supplying Data on Response Station Systems" is 50%. To maintain consistency with the Kessler & Gehman study, we have used 10%, thus predicting more interference.





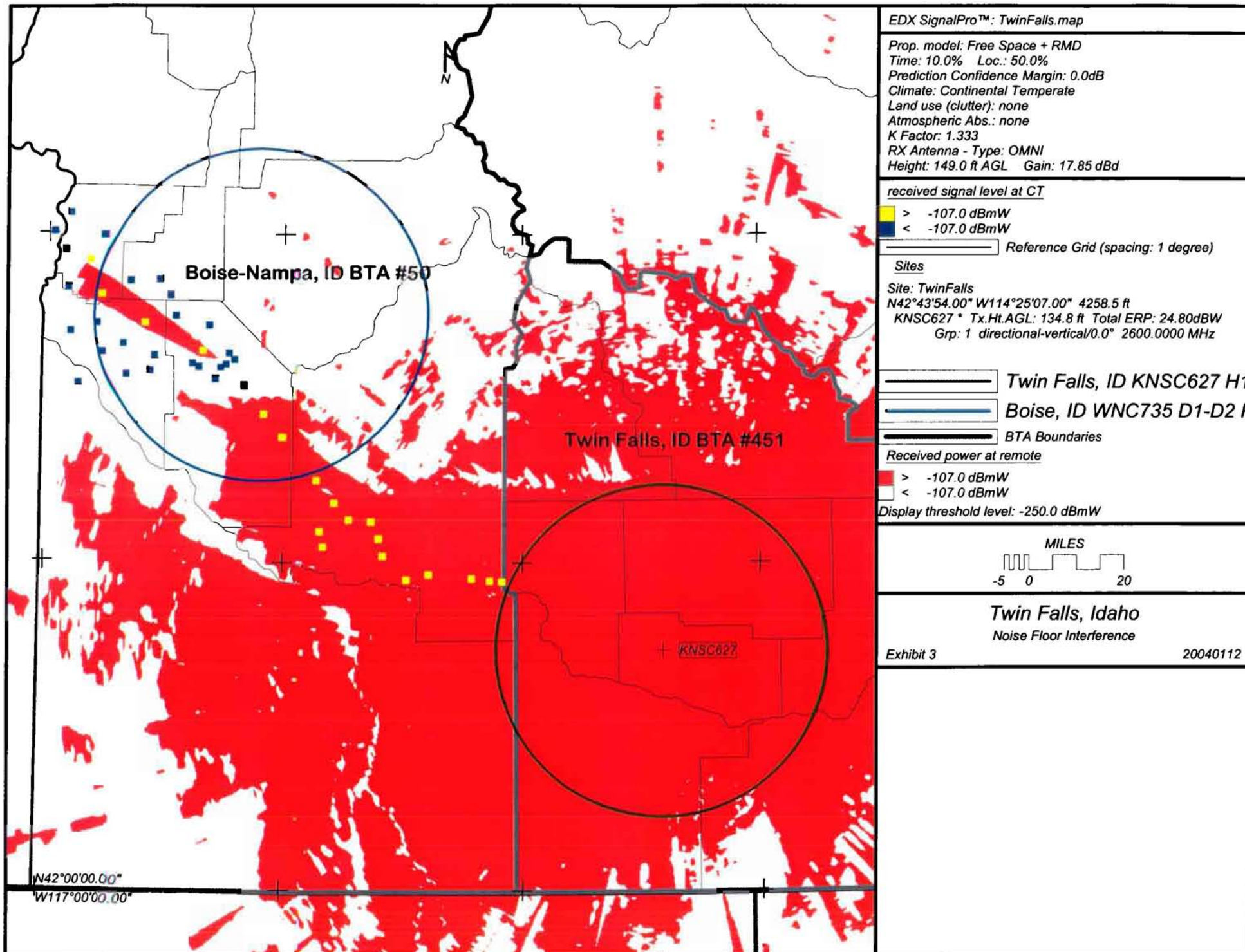


## Sprint - Twin Falls, ID to Boise, ID

## Exhibit 2

Sprint Boise-Nampa, ID BTA #50 cell sites	Dist. (mi.) from Twin Falls, ID KN5C627	Received signal level (dBmW) from Twin Falls, ID KN5C627	Longitude	Latitude	Site elev. (meters)	Ant. Height, AGL (meters)
SL03UB506	140.0	-138.3	-116.770278	43.815556	792	82
SL03UB507	136.8	-150.9	-116.657500	43.857500	733	61
SL03UB508	131.8	-157.4	-116.530000	43.861667	727	31
SL03UB504	127.9	-154.2	-116.481111	43.814167	914	59
SL03UB511	137.7	-140.5	-116.788056	43.728611	742	64
SL03UB512	129.2	-146.7	-116.590556	43.729167	762	58
SL03UB513	124.5	-151.5	-116.456944	43.752222	853	55
SL03UB515	133.8	-129.7	-116.765278	43.640278	765	61
SL03UB516	131.2	-137.1	-116.685833	43.666389	728	32
SL03UB517	127.5	-132.7	-116.671667	43.571944	792	46
SL03UB518	123.3	-136.3	-116.568056	43.584167	762	34
SL03UB519	110.6	-149.5	-116.267222	43.595000	823	26
SL03UB520	124.0	-138.8	-116.549444	43.630556	755	56
SL03UB521	116.1	-143.4	-116.386389	43.607500	797	24
SL03UB522	115.6	-149.8	-116.341389	43.646389	802	61
SL03UB523	260.4	-174.0	-116.281667	39.233333	194	34
SL03UB524	110.7	-157.0	-116.231389	43.639167	822	15
SL03UB525	110.0	-151.3	-116.244444	43.605000	837	21
SL03UB526	109.0	-156.1	-116.208056	43.619444	828	46
SL03UB527	110.3	-142.4	-116.290000	43.559722	850	29
SL03UB528	104.2	-148.8	-116.165833	43.536944	914	12
SL03UB529	97.5	-134.2	-116.080833	43.452778	1062	61
SL03UB592	114.6	-143.0	-116.359167	43.597500	795	24
SL03UB593	104.4	-148.8	-116.168056	43.540278	896	9
SL03UB563	117.6	-159.6	-116.316944	43.723611	785	52
SL03UB655	91.6	-125.0	-116.000556	43.382500	1036	24
SL03UB500	155.1	-153.6	-116.907500	44.062778	732	43
SL03UB501	155.7	-151.8	-116.977222	44.005833	646	37
SL03UB502	146.6	-156.2	-116.763611	43.996111	669	58
SL03UB503	151.5	-149.8	-116.928333	43.948889	731	31
SL03UB504	146.0	-154.0	-116.821667	43.920000	736	76
SL03UB505	146.8	-142.5	-116.912778	43.835833	792	15
SL03UB510	141.8	-137.1	-116.900278	43.702778	731	61
SL03UB531	81.1	-113.1	-115.856944	43.251389	996	64
SL03UB532	75.5	-117.7	-115.779444	43.182500	975	61
SL03UB533	71.2	-97.3	-115.717222	43.131389	959	37
SL03UB534	66.8	-85.9	-115.625556	43.125556	1158	31
SL03UB535	74.5	-114.9	-115.826389	43.048611	938	21
SL03UB536	55.9	-123.4	-115.481389	42.947500	792	61
SL03UB537	51.8	-73.7	-115.391667	42.963889	913	61
SL03UB538	42.9	-65.2	-115.210278	42.951944	843	76
SL03UB539	36.8	-67.9	-115.085833	42.941944	924	34
SL03UB651	135.4	-132.0	-116.863056	43.544722	711	61
SL03UB657	64.0	-81.2	-115.594444	43.073889	968	61
SL03UB658	62.0	-80.9	-115.577778	43.021111	952	61
SL03UB659	76.2	-119.4	-115.841389	43.095278	950	46
SL03UB660	39.2	-70.8	-115.135833	42.944722	850	61





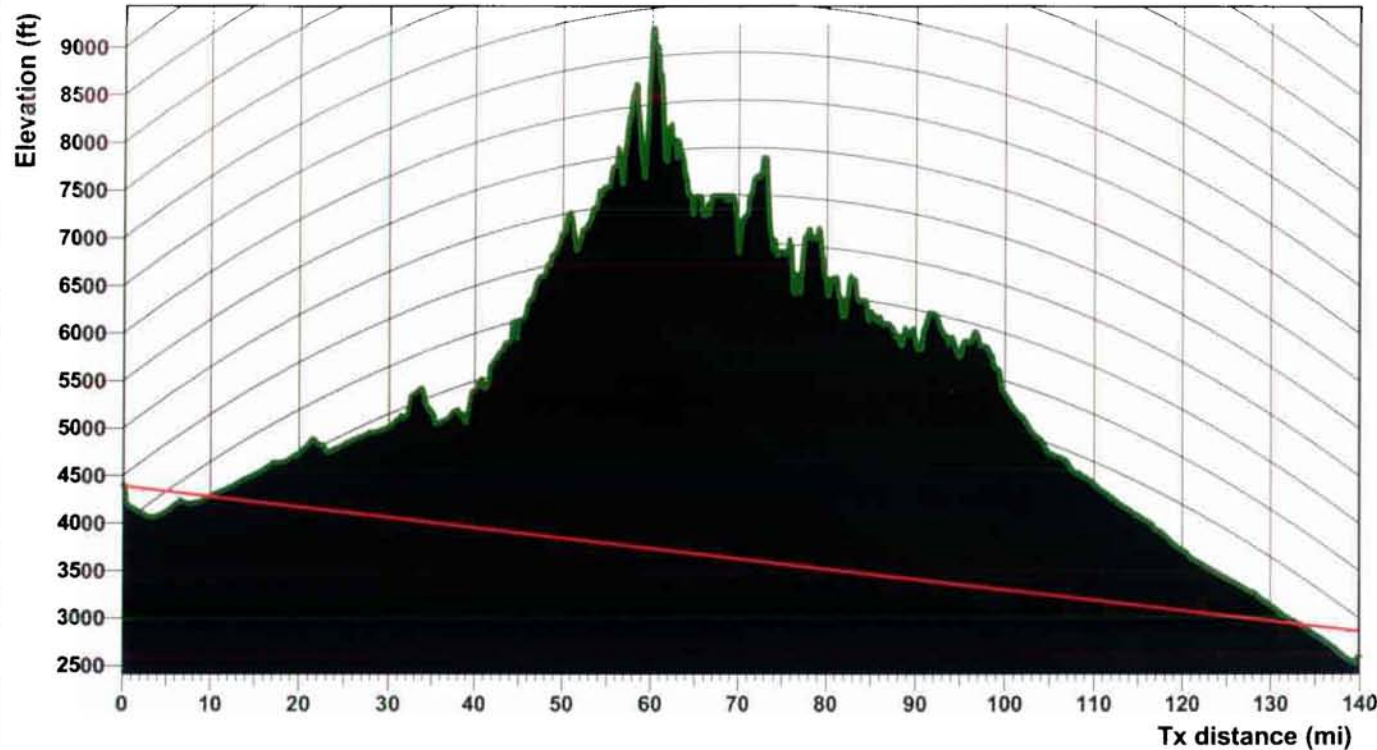


**EDX SignalPro™**

Prop. model: Longley-Rice v1.2.2  
 Time: 10.00 % Loc.: 50.00 %  
 Margin: 0.00 dB  
 Climate: Continental Temperate  
 Atm. factor: none  
 K factors: 1.333, 1.000, 1.000

Reliability Analysis

Fade outage method: Vigants-Barnett  
 C param. for Vigants-Barnett:  
 average prop. conditions: C=1  
 ITU-R terrain type: Inland  
 ITU-R refract. grad.: 10.0 %  
 External interf.: -100.0 dBmW  
 Dispersive fade margin: 50.0 dB  
 Ant. spacing (diversity): 0.0 ft  
 Rain outage method: Crane  
 Rain region: A



Transmitter Site: KNSC627  
 Name: KNSC627  
 Location:  
 N42°43'54.00" W114°25'07.00"  
 Site elevation: 4258.5 ft  
 Antenna height: 134.8 ft  
 Pointing azimuth: 303.1 °  
 Transmitter power: 20.00 dBW  
 Trans. line loss: 3.00 dB  
 Other losses: 5.20 dB  
 Antenna gain: 13.00 dBi  
 Antenna file: HMD12VO.PAT  
 Total ERP: 24.80 dBW

Name: KNSC627 ->506  
 Frequency: 2600.0000 MHz  
 Polarization: vertical  
 Length: 139.93 mi  
 Number of obstacles: 0  
 Excess path loss: 62.03 dB  
 Atm. absorption loss: 0.00 dB  
 Path loss for stats: 209.83 dB  
 Flat fade margin: -58.92 dB  
 Total fade margin: -58.92 dB  
 Annual fade outage: 3942000.00 s  
 Annual rain outage: 0.00 s  
 Link availability: 50.0000 %

Receiver Site: 506  
 Name: SL03UB506  
 Location:  
 N43°48'56.00" W116°46'13.00"  
 Site elevation: 2598.0 ft  
 Antenna height: 269.0 ft  
 Pointing azimuth: 123.1 °  
 Trans. line loss: 0.00 dB  
 Other losses: 0.00 dB  
 Antenna gain: 16.50 dBi  
 Antenna file: DMP18NQ90-V.pat  
 Received signal level: -170.59 dBW

Notes

**Twin Falls, ID**  
 Terrain Profile & Propagation

**EDX SignalPro™**

Prop. model: Longley-Rice v1.2.2  
 Time: 10.00 % Loc.: 50.00 %  
 Margin: 0.00 dB  
 Climate: Continental Temperate  
 Atm. factor: none  
 K factors: 1.333, 1.000, 1.000

Reliability Analysis

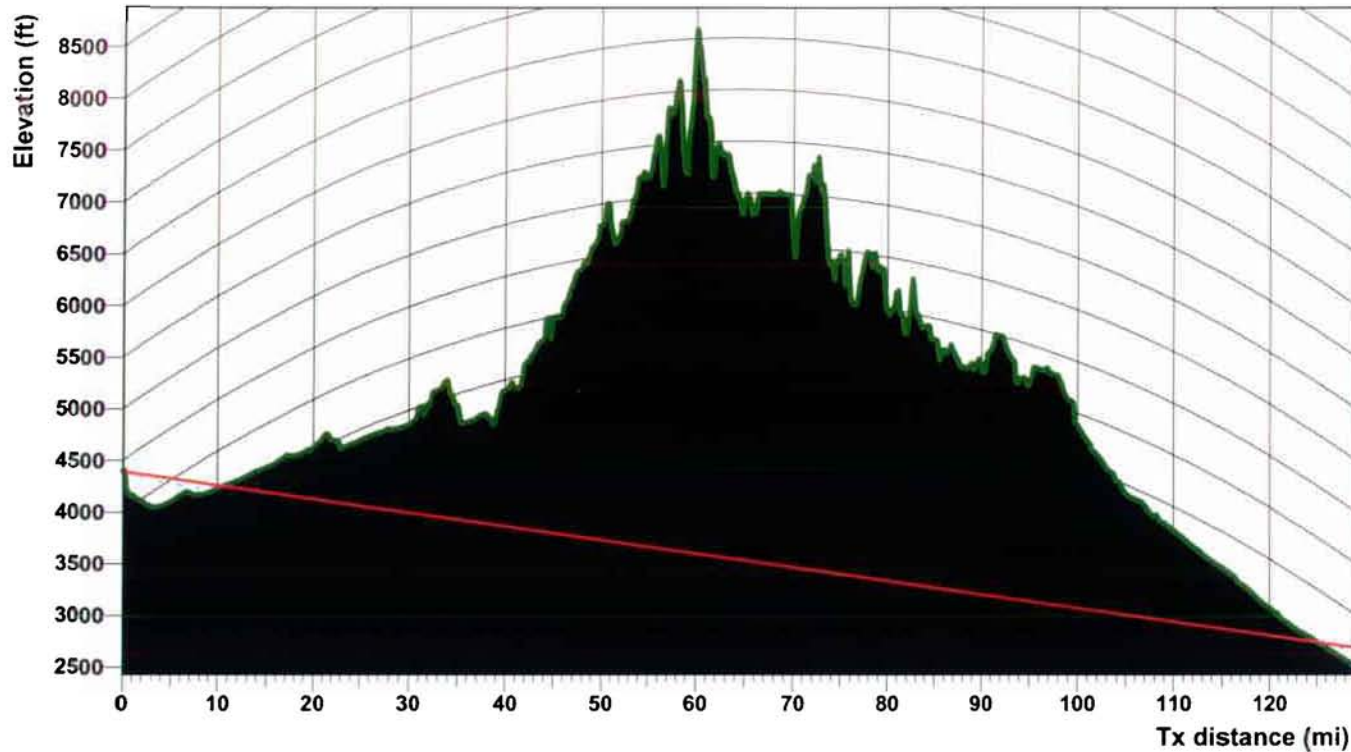
Fade outage method: Vigants-Barnett  
 C param. for Vigants-Barnett:  
 average prop. conditions: C=1  
 ITU-R terrain type: Inland  
 ITU-R refract. grad.: 10.0 %  
 External interf.: -100.0 dBmW  
 Dispersive fade margin: 50.0 dB  
 Ant. spacing (diversity): 0.0 ft  
 Rain outage method: Crane  
 Rain region: A

Notes**Twin Falls, ID**

Terrain Profile &amp; Propagation

Exhibit 5

20040112



Transmitter Site: KNSC627  
 Name: KNSC627  
 Location:  
 N42°43'54.00" W114°25'07.00"  
 Site elevation: 4258.5 ft  
 Antenna height: 134.8 ft  
 Pointing azimuth: 303.0 °  
 Transmitter power: 20.00 dBW  
 Trans. line loss: 3.00 dB  
 Other losses: 5.20 dB  
 Antenna gain: 13.00 dBi  
 Antenna file: HMD12VO.PAT  
 Total ERP: 24.80 dBW

Name: KNSC627 ->512  
 Frequency: 2600.0000 MHz  
 Polarization: vertical  
 Length: 129.17 mi  
 Number of obstacles: 0  
 Excess path loss: 61.77 dB  
 Atm. absorption loss: 0.00 dB  
 Path loss for stats: 208.88 dB  
 Flat fade margin: -57.91 dB  
 Total fade margin: -57.91 dB  
 Annual fade outage: 3942000.00 s  
 Annual rain outage: 0.00 s  
 Link availability: 50.0000 %

Receiver Site: 512  
 Name: SL03UB512  
 Location:  
 N43°43'45.00" W116°35'26.00"  
 Site elevation: 2500.0 ft  
 Antenna height: 190.0 ft  
 Pointing azimuth: 123.0 °  
 Trans. line loss: 0.00 dB  
 Other losses: 0.00 dB  
 Antenna gain: 16.50 dBi  
 Antenna file: DMP18NQ90-V.pat  
 Received signal level: -169.58 dBW



**EDX SignalPro™**

Prop. model: Longley-Rice v1.2.2  
 Time: 10.00 % Loc.: 50.00 %  
 Margin: 0.00 dB  
 Climate: Continental Temperate  
 Atm. factor: none  
 K factors: 1.333, 1.000, 1.000

Reliability Analysis

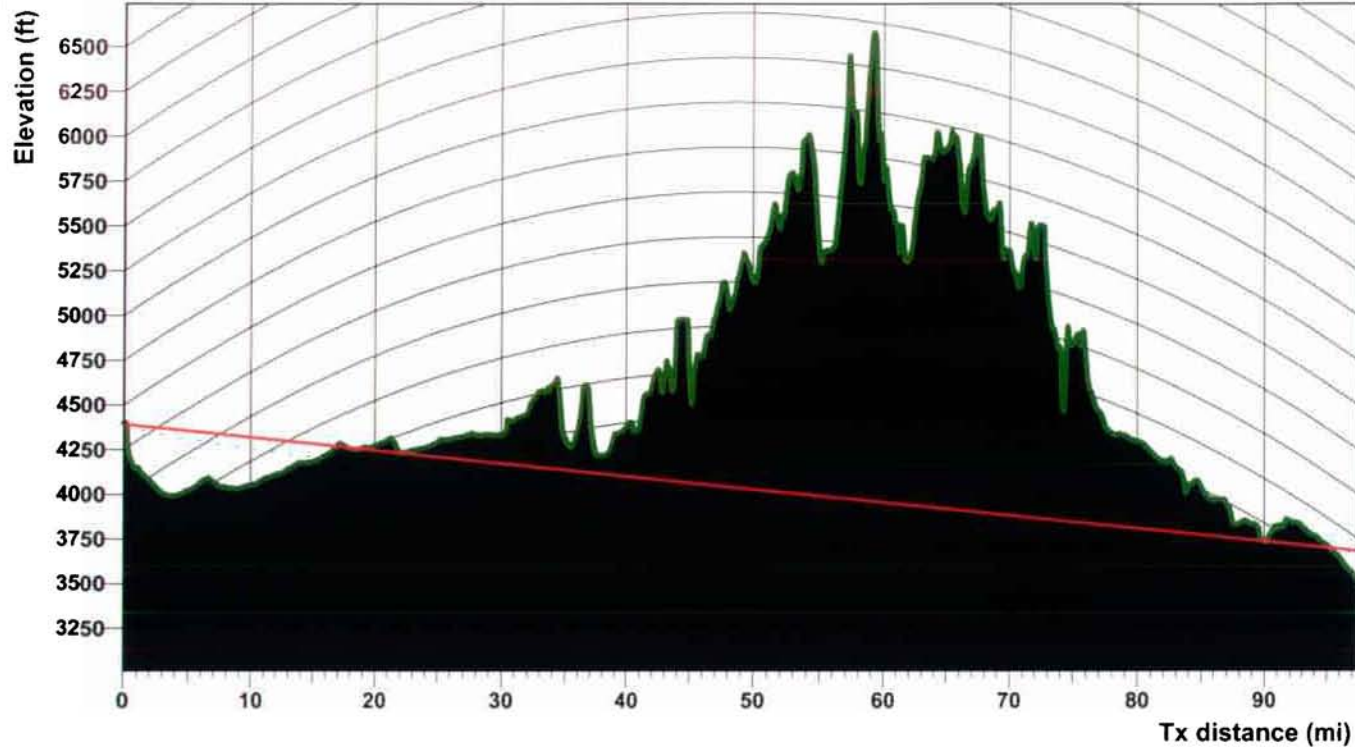
Fade outage method: Vigants-Barnett  
 C param. for Vigants-Barnett:  
 average prop. conditions: C=1  
 ITU-R terrain type: Inland  
 ITU-R refract. grad.: 10.0 %  
 External interf.: -100.0 dBmW  
 Dispersive fade margin: 50.0 dB  
 Ant. spacing (diversity): 0.0 ft  
 Rain outage method: Crane  
 Rain region: A

Notes**Twin Falls, ID**

Terrain Profile &amp; Propagation

Exhibit 6

20040112



Transmitter Site: KNSC627  
 Name: KNSC627  
 Location:  
 N42°43'54.00" W114°25'07.00"  
 Site elevation: 4258.5 ft  
 Antenna height: 134.8 ft  
 Pointing azimuth: 301.3 °  
 Transmitter power: 20.00 dBW  
 Trans. line loss: 3.00 dB  
 Other losses: 5.20 dB  
 Antenna gain: 13.00 dBi  
 Antenna file: HMD12VO.PAT  
 Total ERP: 24.80 dBW

Name: KNSC627 ->529  
 Frequency: 2600.0000 MHz  
 Polarization: vertical  
 Length: 97.49 mi  
 Number of obstacles: 0  
 Excess path loss: 61.88 dB  
 Atm. absorption loss: 0.00 dB  
 Path loss for stats: 206.55 dB  
 Flat fade margin: -55.41 dB  
 Total fade margin: -55.41 dB  
 Annual fade outage: 3942000.00 s  
 Annual rain outage: 0.00 s  
 Link availability: 50.0000 %

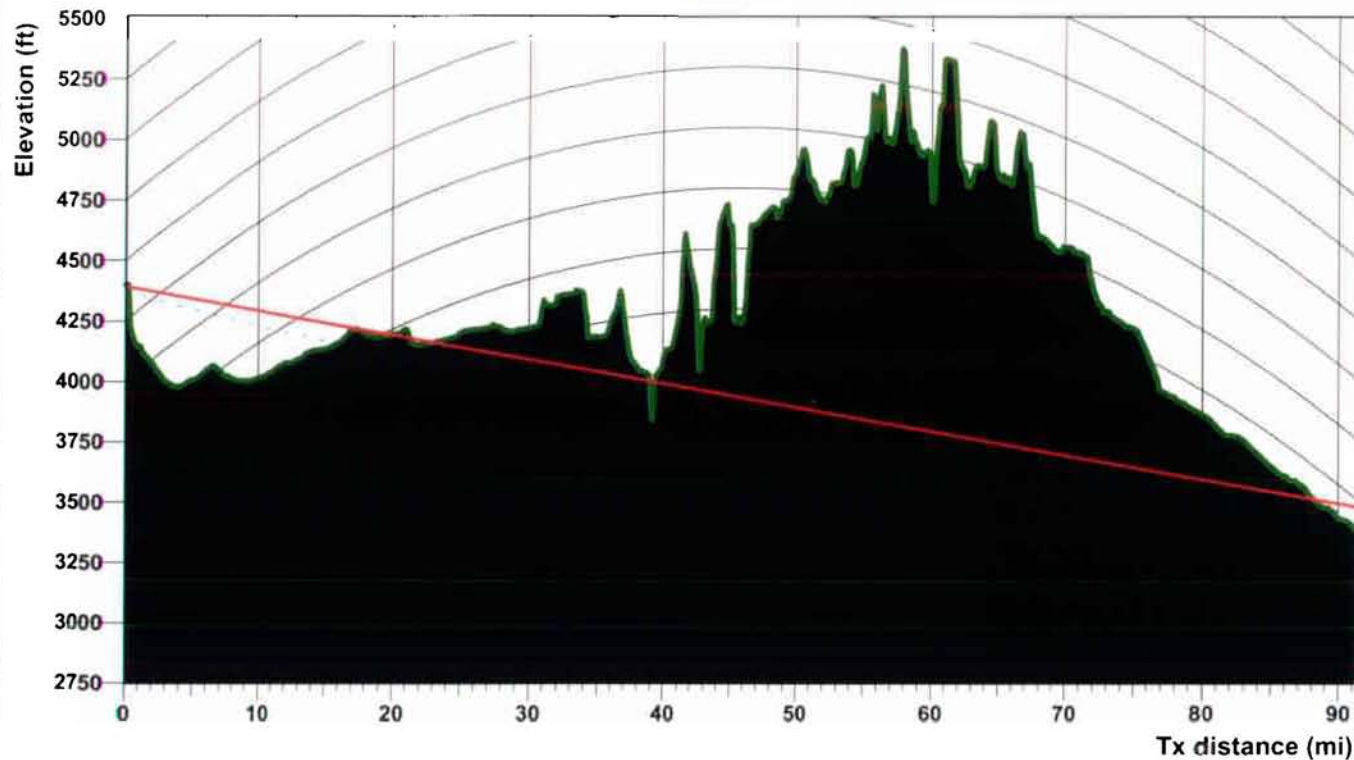
Receiver Site: 529  
 Name: SL03UB529  
 Location:  
 N43°27'10.00" W116°04'51.00"  
 Site elevation: 3484.0 ft  
 Antenna height: 200.0 ft  
 Pointing azimuth: 121.3 °  
 Trans. line loss: 0.00 dB  
 Other losses: 0.00 dB  
 Antenna gain: 16.50 dBi  
 Antenna file: DMP18NQ90-V.pat  
 Received signal level: -167.07 dBW

## EDX SignalPro™

Prop. model: Longley-Rice v1.2.2  
 Time: 10.00 % Loc.: 50.00 %  
 Margin: 0.00 dB  
 Climate: Continental Temperate  
 Atm. factor: none  
 K factors: 1.333, 1.000, 1.000

Reliability Analysis

Fade outage method: Vigants-Barnett  
 C param. for Vigants-Barnett:  
 average prop. conditions: C=1  
 ITU-R terrain type: Inland  
 ITU-R refract. grad.: 10.0 %  
 External interf.: -100.0 dBmW  
 Dispersive fade margin: 50.0 dB  
 Ant. spacing (diversity): 0.0 ft  
 Rain outage method: Crane  
 Rain region: A



Transmitter Site: KNSC627  
 Name: KNSC627  
 Location:  
 N42°43'54.00" W114°25'07.00"  
 Site elevation: 4258.5 ft  
 Antenna height: 134.8 ft  
 Pointing azimuth: 299.9 °  
 Transmitter power: 20.00 dBW  
 Trans. line loss: 3.00 dB  
 Other losses: 5.20 dB  
 Antenna gain: 13.00 dBi  
 Antenna file: HMD12VO.PAT  
 Total ERP: 24.80 dBW

Name: KNSC627 ->655  
 Frequency: 2600.0000 MHz  
 Polarization: vertical  
 Length: 91.60 mi  
 Number of obstacles: 0  
 Excess path loss: 53.02 dB  
 Atm. absorption loss: 0.00 dB  
 Path loss for stats: 197.15 dB  
 Flat fade margin: -45.99 dB  
 Total fade margin: -45.99 dB  
 Annual fade outage: 3942000.00 s  
 Annual rain outage: 0.00 s  
 Link availability: 50.0000 %

Receiver Site: 655  
 Name: SL03UB655  
 Location:  
 N43°22'57.00" W116°00'02.00"  
 Site elevation: 3399.0 ft  
 Antenna height: 79.0 ft  
 Pointing azimuth: 119.9 °  
 Trans. line loss: 0.00 dB  
 Other losses: 0.00 dB  
 Antenna gain: 16.50 dBi  
 Antenna file: DMP18NQ90-V.pat  
 Received signal level: -157.66 dBW

Notes

**Twin Falls, ID**  
 Terrain Profile & Propagation

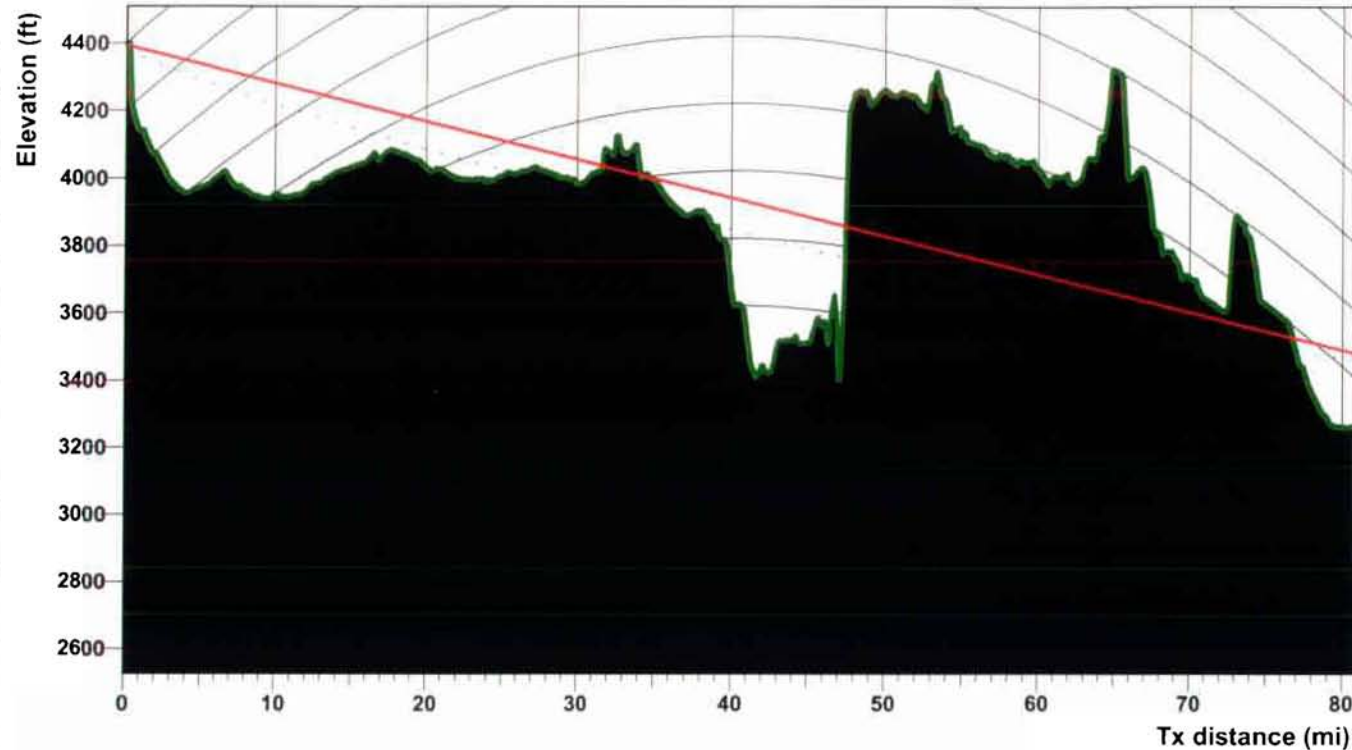


**EDX SignalPro™**

Prop. model: Longley-Rice v1.2.2  
 Time: 10.00 % Loc.: 50.00 %  
 Margin: 0.00 dB  
 Climate: Continental Temperate  
 Atm. factor: none  
 K factors: 1.333, 1.000, 1.000

Reliability Analysis

Fade outage method: Vigants-Barnett  
 C param. for Vigants-Barnett:  
 average prop. conditions: C=1  
 ITU-R terrain type: Inland  
 ITU-R refract. grad.: 10.0 %  
 External interf.: -100.0 dBmW  
 Dispersive fade margin: 50.0 dB  
 Ant. spacing (diversity): 0.0 ft  
 Rain outage method: Crane  
 Rain region: A



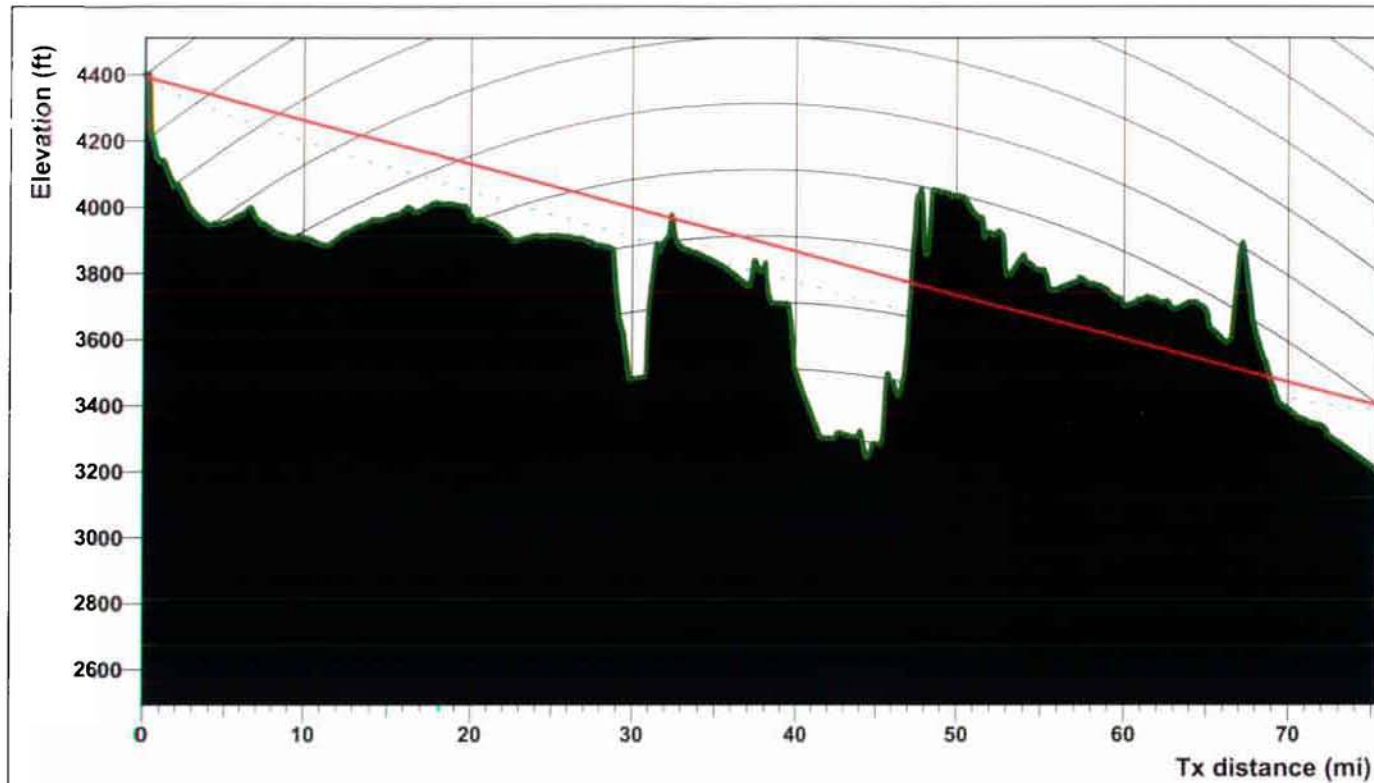
Transmitter Site: KNSC627  
 Name: KNSC627  
 Location:  
 N42°43'54.00" W114°25'07.00"  
 Site elevation: 4258.5 ft  
 Antenna height: 134.8 ft  
 Pointing azimuth: 296.8 °  
 Transmitter power: 20.00 dBW  
 Trans. line loss: 3.00 dB  
 Other losses: 5.20 dB  
 Antenna gain: 13.00 dBi  
 Antenna file: HMD12VO.PAT  
 Total ERP: 24.80 dBW

Name: KNSC627 ->531  
 Frequency: 2600.0000 MHz  
 Polarization: vertical  
 Length: 81.03 mi  
 Number of obstacles: 0  
 Excess path loss: 42.05 dB  
 Atm. absorption loss: 0.00 dB  
 Path loss for stats: 185.11 dB  
 Flat fade margin: -33.91 dB  
 Total fade margin: -33.91 dB  
 Annual fade outage: 3942000.00 s  
 Annual rain outage: 0.00 s  
 Link availability: 50.0000 %

Receiver Site: 531  
 Name: SL03UB531  
 Location:  
 N43°15'05.00" W115°51'25.00"  
 Site elevation: 3268.0 ft  
 Antenna height: 210.0 ft  
 Pointing azimuth: 116.8 °  
 Trans. line loss: 0.00 dB  
 Other losses: 0.00 dB  
 Antenna gain: 16.50 dBi  
 Antenna file: DMP18NQ90-V.pat  
 Received signal level: -145.58 dBW

Notes

**Twin Falls, ID**  
 Terrain Profile & Propagation

**EDX SignalPro™**

Prop. model: Longley-Rice v1.2.2  
 Time: 10.00 % Loc.: 50.00 %  
 Margin: 0.00 dB  
 Climate: Continental Temperate  
 Atm. factor: none  
 K factors: 1.333, 1.000, 1.000

Reliability Analysis

Fade outage method: Vigants-Barnett  
 C param. for Vigants-Barnett:  
 average prop. conditions: C=1  
 ITU-R terrain type: Inland  
 ITU-R refract. grad.: 10.0 %  
 External interf.: -100.0 dBmW  
 Dispersive fade margin: 50.0 dB  
 Ant. spacing (diversity): 0.0 ft  
 Rain outage method: Crane  
 Rain region: A

Transmitter Site: KNSC627  
 Name: KNSC627  
 Location:  
 N42°43'54.00" W114°25'07.00"  
 Site elevation: 4258.5 ft  
 Antenna height: 134.8 ft  
 Pointing azimuth: 294.8 °  
 Transmitter power: 20.00 dBW  
 Trans. line loss: 3.00 dB  
 Other losses: 5.20 dB  
 Antenna gain: 13.00 dBi  
 Antenna file: HMD12VO.PAT  
 Total ERP: 24.80 dBW

Name: KNSC627 ->532  
 Frequency: 2600.0000 MHz  
 Polarization: vertical  
 Length: 75.49 mi  
 Number of obstacles: 0  
 Excess path loss: 50.32 dB  
 Atm. absorption loss: 0.00 dB  
 Path loss for stats: 192.76 dB  
 Flat fade margin: -41.54 dB  
 Total fade margin: -41.54 dB  
 Annual fade outage: 3942000.00 s  
 Annual rain outage: 0.00 s  
 Link availability: 50.0000 %

Receiver Site: 532  
 Name: SL03UB532  
 Location:  
 N43°10'57.00" W115°46'46.00"  
 Site elevation: 3199.0 ft  
 Antenna height: 200.0 ft  
 Pointing azimuth: 114.8 °  
 Trans. line loss: 0.00 dB  
 Other losses: 0.00 dB  
 Antenna gain: 16.50 dBi  
 Antenna file: DMP18NQ90-V.pat  
 Received signal level: -153.21 dBW

Notes

**Twin Falls, ID**  
 Terrain Profile & Propagation

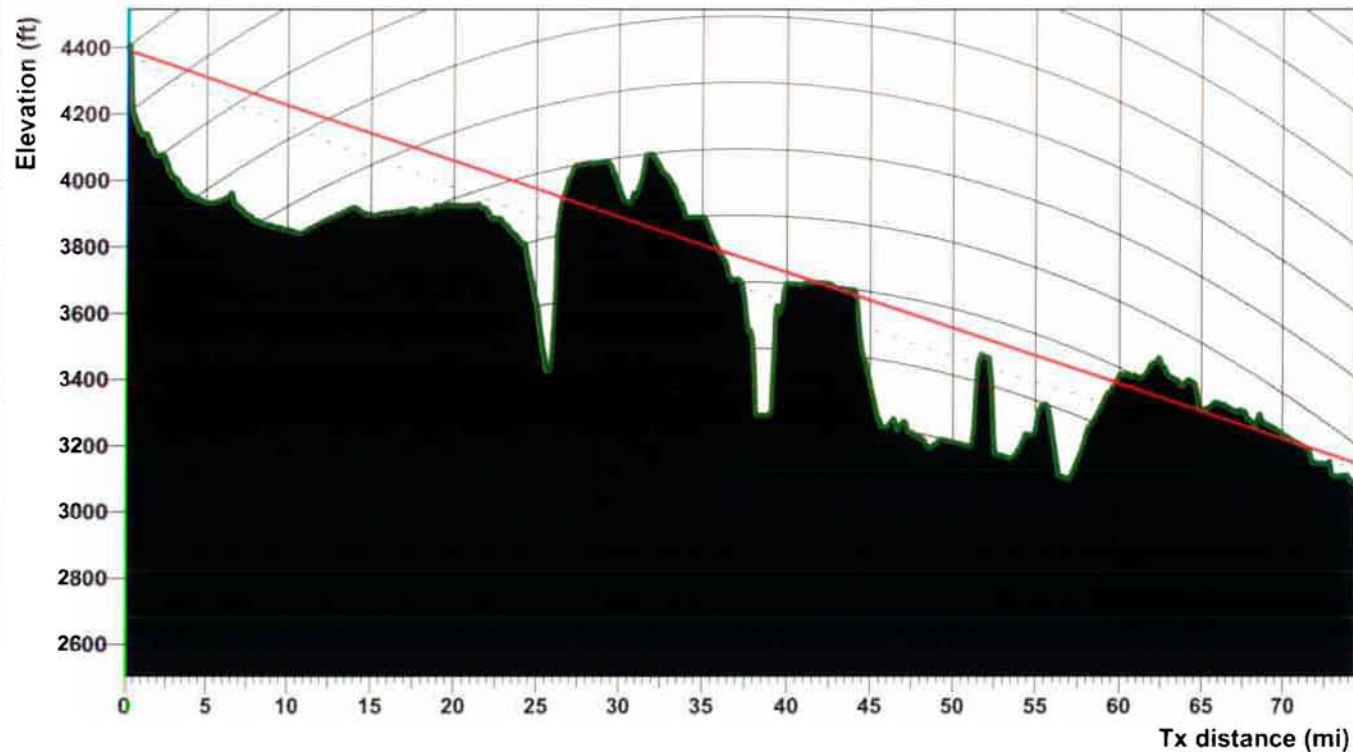


**EDX SignalPro™**

Prop. model: Longley-Rice v1.2.2  
 Time: 10.00 % Loc.: 50.00 %  
 Margin: 0.00 dB  
 Climate: Continental Temperate  
 Atm. factor: none  
 K factors: 1.333, 1.000, 1.000

Reliability Analysis

Fade outage method: Vigants-Barnett  
 C param. for Vigants-Barnett:  
 average prop. conditions: C=1  
 ITU-R terrain type: Inland  
 ITU-R refract. grad.: 10.0 %  
 External interf.: -100.0 dBmW  
 Dispersive fade margin: 50.0 dB  
 Ant. spacing (diversity): 0.0 ft  
 Rain outage method: Crane  
 Rain region: A



Transmitter Site: KNSC627  
 Name: KNSC627  
 Location:  
 N42°43'54.00" W114°25'07.00"  
 Site elevation: 4258.5 ft  
 Antenna height: 134.8 ft  
 Pointing azimuth: 287.6 °  
 Transmitter power: 20.00 dBW  
 Trans. line loss: 3.00 dB  
 Other losses: 5.20 dB  
 Antenna gain: 13.00 dBi  
 Antenna file: HMD12VO.PAT  
 Total ERP: 24.80 dBW

Name: KNSC627 ->535  
 Frequency: 2600.0000 MHz  
 Polarization: vertical  
 Length: 74.51 mi  
 Number of obstacles: 0  
 Excess path loss: 43.67 dB  
 Atm. absorption loss: 0.00 dB  
 Path loss for stats: 186.00 dB  
 Flat fade margin: -34.79 dB  
 Total fade margin: -34.79 dB  
 Annual fade outage: 3942000.00 s  
 Annual rain outage: 0.00 s  
 Link availability: 50.0000 %

Receiver Site: 535  
 Name: SL03UB535  
 Location:  
 N43°02'55.00" W115°49'35.00"  
 Site elevation: 3077.0 ft  
 Antenna height: 69.0 ft  
 Pointing azimuth: 107.6 °  
 Trans. line loss: 0.00 dB  
 Other losses: 0.00 dB  
 Antenna gain: 16.50 dBi  
 Antenna file: DMP18NQ90-V.pat  
 Received signal level: -146.46 dBW

Notes

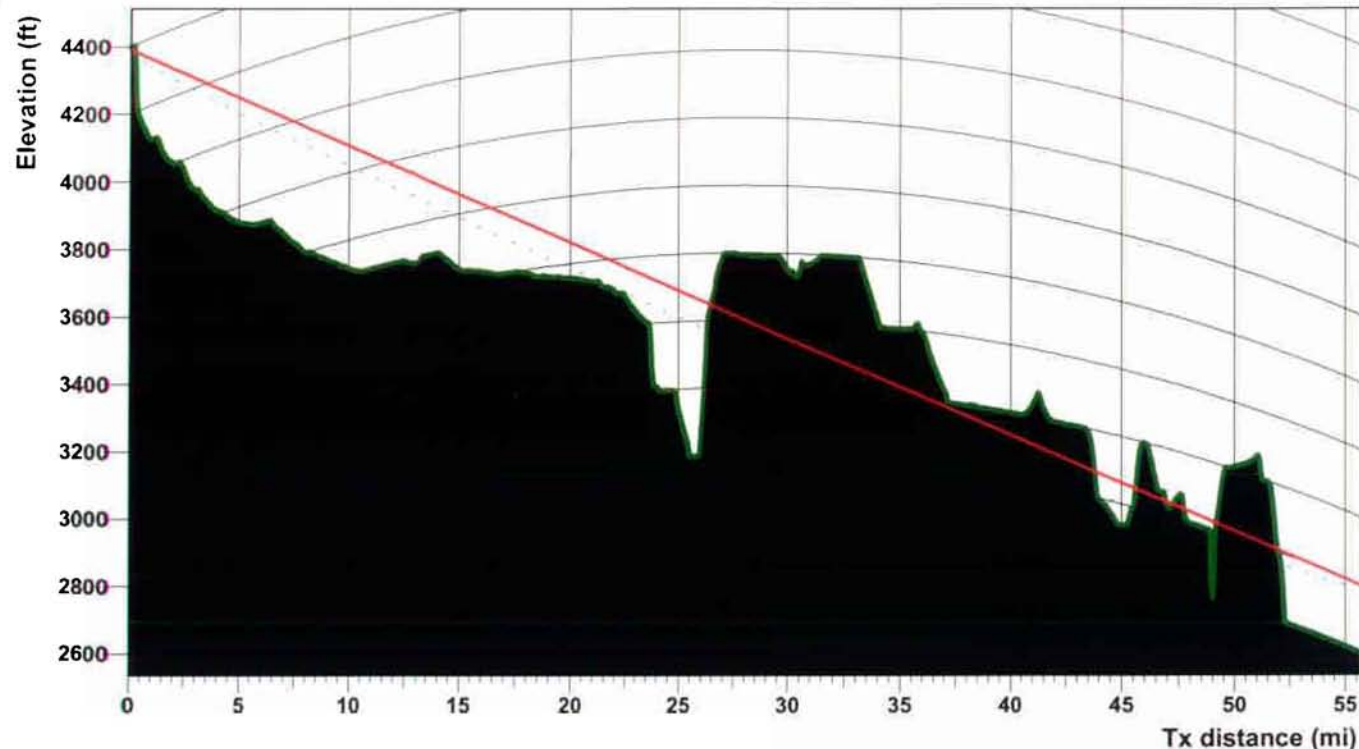
**Twin Falls, ID**  
 Terrain Profile & Propagation

## EDX SignalPro™

Prop. model: Longley-Rice v1.2.2  
 Time: 10.00 % Loc.: 50.00 %  
 Margin: 0.00 dB  
 Climate: Continental Temperate  
 Atm. factor: none  
 K factors: 1.333, 1.000, 1.000

Reliability Analysis

Fade outage method: Vigants-Barnett  
 C param. for Vigants-Barnett:  
 average prop. conditions: C=1  
 ITU-R terrain type: Inland  
 ITU-R refract. grad.: 10.0 %  
 External interf.: -100.0 dBmW  
 Dispersive fade margin: 50.0 dB  
 Ant. spacing (diversity): 0.0 ft  
 Rain outage method: Crane  
 Rain region: A



Transmitter Site: KNSC627  
 Name: KNSC627  
 Location:  
 N42°43'54.00" W114°25'07.00"  
 Site elevation: 4258.5 ft  
 Antenna height: 134.8 ft  
 Pointing azimuth: 285.8 °  
 Transmitter power: 20.00 dBW  
 Trans. line loss: 3.00 dB  
 Other losses: 5.20 dB  
 Antenna gain: 13.00 dBi  
 Antenna file: HMD12VO.PAT  
 Total ERP: 24.80 dBW

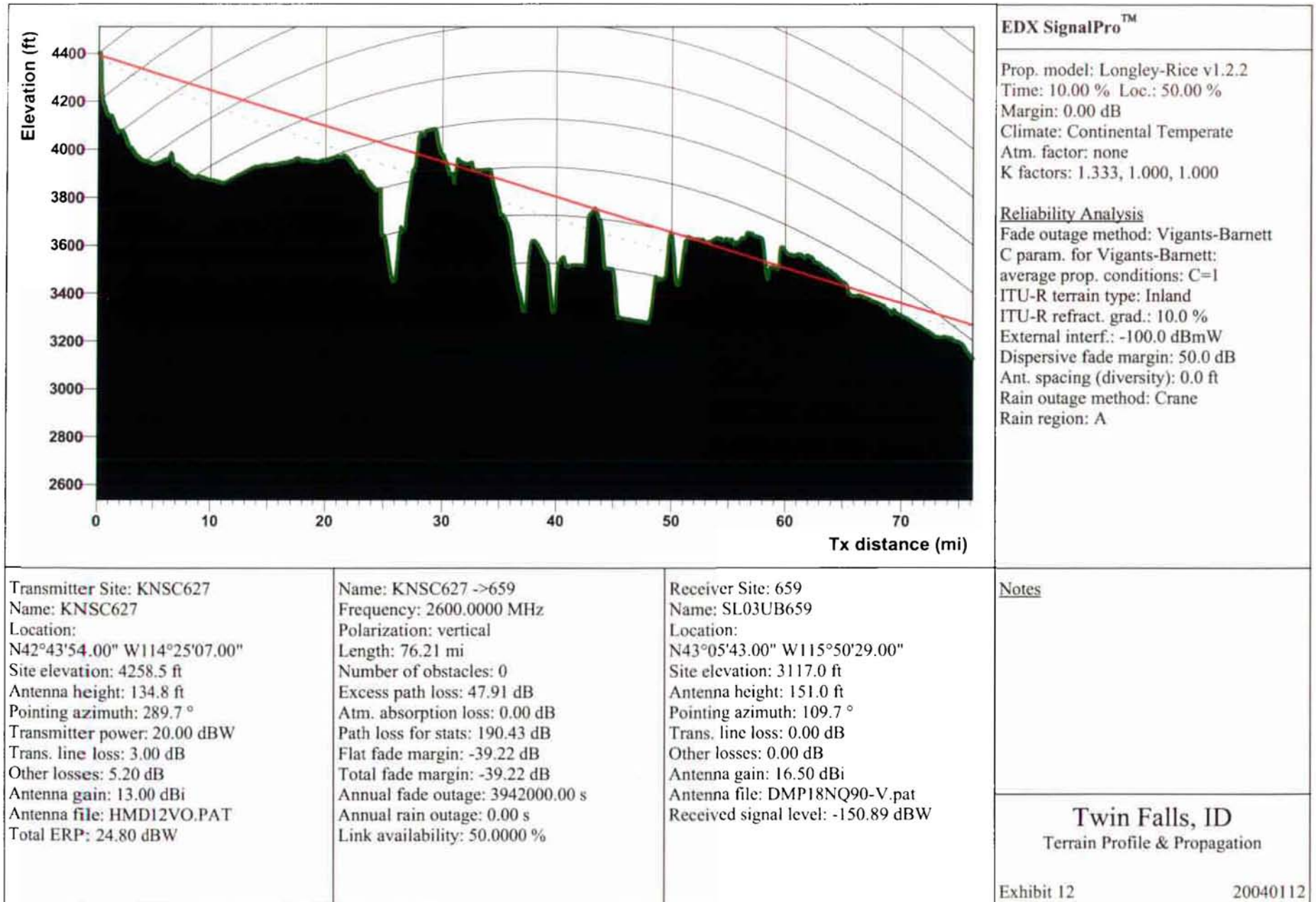
Name: KNSC627 ->536  
 Frequency: 2600.0000 MHz  
 Polarization: vertical  
 Length: 55.84 mi  
 Number of obstacles: 0  
 Excess path loss: 55.77 dB  
 Atm. absorption loss: 0.00 dB  
 Path loss for stats: 195.59 dB  
 Flat fade margin: -44.33 dB  
 Total fade margin: -44.33 dB  
 Annual fade outage: 3942000.00 s  
 Annual rain outage: 0.00 s  
 Link availability: 50.0000 %

Receiver Site: 536  
 Name: SL03UB536  
 Location:  
 N42°56'51.00" W115°28'53.00"  
 Site elevation: 2598.0 ft  
 Antenna height: 200.0 ft  
 Pointing azimuth: 105.8 °  
 Trans. line loss: 0.00 dB  
 Other losses: 0.00 dB  
 Antenna gain: 16.50 dBi  
 Antenna file: DMP18NQ90-V.pat  
 Received signal level: -156.00 dBW

Notes

**Twin Falls, ID**  
 Terrain Profile & Propagation





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